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Molecular Verification of Bat Species Collected in Ecuador: Results of a Country-Wide Survey

Molly M. McDonough, Adam W. Ferguson, Loren K. Ammerman, Carolina Granja-Vizcaino, Santiago F. Burneo, and Robert J. Baker

Abstract

We report the results of a two-month bat survey from 33 different sampling localities in the country of Ecuador conducted in the summer of 2006. Biologists from Angelo State University and the Pontificia Universidad Católica del Ecuador participated in this survey that was designed to collect information on bats from a diverse set of habitats and locations, with a particular emphasis on anthropogenic roost sites. We were particularly interested in documenting diversity of the family Molossidae in Ecuador. Between 20 June and 12 August 2006 we captured a total of 361 bats, of which, a subset totaling 163 individuals representing 45 species were collected and prepared as museum vouchers with associated tissues. Species were identified using traditional morphology and DNA sequences from the mitochondrial genes cytochrome oxidase subunit I (*COI*) or cytochrome-*b*. Noteworthy distributional records, unique genetic lineages, and use of urban roosts are discussed.

Key words: Chiroptera, *COI*, cytochrome-*b*, Ecuador, Molossidae

Resumen

Reportamos aquí los resultados de un inventario biológico, para especies de murciélagos, colectados por dos meses y en 33 localidades en el Ecuador durante el verano de 2006. Investigadores de Angelo State University y la Pontificia Universidad Católica del Ecuador participaron en este estudio cuyo objetivo principal fue obtener información sobre las especies de murciélagos en un conjunto diverso de hábitats y localidades, con particular énfasis en refugios antropogénicos. El objetivo principal fué documentar la diversidad de la familia Molossidae en el oriente del Ecuador. Entre el 20 de junio y el 12 de agosto de 2006 un total de 361 murciélagos fueron capturados, de los cuáles un grupo de 163 individuos de 45 especies se colectaron y prepararon como especímenes testigo de museo y tejidos asociados. Las especies fueron identificadas siguiendo morfología tradicional y secuencias de ADN de genes mitocondriales de la citocromo

oxidasa subunidad 1 *COI* o del citocromo-*b*. Se discuten los registros notables de distribución, linajes genéticos únicos y el uso de refugios urbanos.

Palabras clave: Chiroptera, citocromo–*b*, *COI*, Ecuador, Molossidae

INTRODUCTION

Despite its relatively small size (283,561km²), the South American country of Ecuador boasts a disproportionate level of biodiversity, ranking 4th among South American countries in mammalian diversity with over 400 species (Tirira and Burneo 2011). A major component of this diversity (160 species, 39.6% of the total) belongs to the order Chiroptera (Tirira and Burneo 2011). Knowledge of Ecuador's bat fauna stems from the many biological surveys conducted across the country's rich ecosystems (Albuja 1982; Albuja 1999; Reid et al. 2000; Lee et al. 2008; Rex et al. 2008; Carrera et al. 2010; Lee et al. 2010). Despite such knowledge, scientists continue to redefine Ecuadorian bat diversity through the application of molecular markers to systematic investigations (Baker et al. 2004; Velazco 2005; Porter et al. 2007; Hoffmann et al. 2008; Baker et al. 2009; Larsen et al. 2010). Use of molecular markers allows scientists to rapidly and accurately identify species while simultaneously assessing a rarely addressed dimension of biodiversity: genetic diversity. Intraspecific genetic diversity provides critical insight into the relatedness within and among populations and contributes to discovery of cryptic biodiversity (Baker and Bradley 2006).

Recent assessments of genetic diversity in neotropical bats, particularly within the family Molossidae (McDonough et al. 2008; Baker et al. 2009), led us to initiate a country-wide survey of bats found in both natural and anthropogenic habitats of Ecuador. Molossids, or free-tailed bats, are often difficult to catch in tropical environments (Reid et al. 2000; Sodré et al. 2008). However, their documented use of anthropogenic structures for roost sites (Reis et al. 2002; Sodré et al. 2008) could provide targeted locations for increasing capture rates of these difficult to study bats.

Between 20 June 2006 and 12 August 2006, we initiated an intense survey of anthropogenic roost sites and natural habitats of Ecuador in an attempt to collect specimens of molossids and other bats for use in systematic studies. Our goal was to cover as much area as possible in order to maximize our chances of capturing molossids across a diverse set of habitat types. Herein, we report results of this two-month long bat survey that included 33 sites across 11 of Ecuador's 24 provinces. We discuss use of anthropogenic roost sites, unique distributional or rare records, and genetic relationships of species captured.

MATERIALS AND METHODS

Sampling Sites

Biologists from Angelo State University (ASU) and Pontificia Universidad Católica del Ecuador (PUCE) conducted fieldwork from 20 June to 12 August 2006. Sampling localities (Fig. 1) were concentrated in urban centers or near human habitations to maximize opportunities for collecting molossids with natural habitats sampled intermittently. Bats were captured by hand or with the use of mist nets or hand nets. Local people often facilitated by locating specific buildings with roosting bats.

Esmeraldas Province:

Site 1.—Bilsa Biological Station, Piscinas Trail at first river crossing (0º21'2"N, 79º42'32"W; elevation 528 m; 31 July 2006). This locality is situated on a large creek that is surrounded by primary rain forest. Mist nets were placed along and over the creek.

Pichincha Province:

Site 2.—2.3 km S, 1.5 km E Mindo, El Monte Sustainable Lodge near Estación Biológica de Mindo

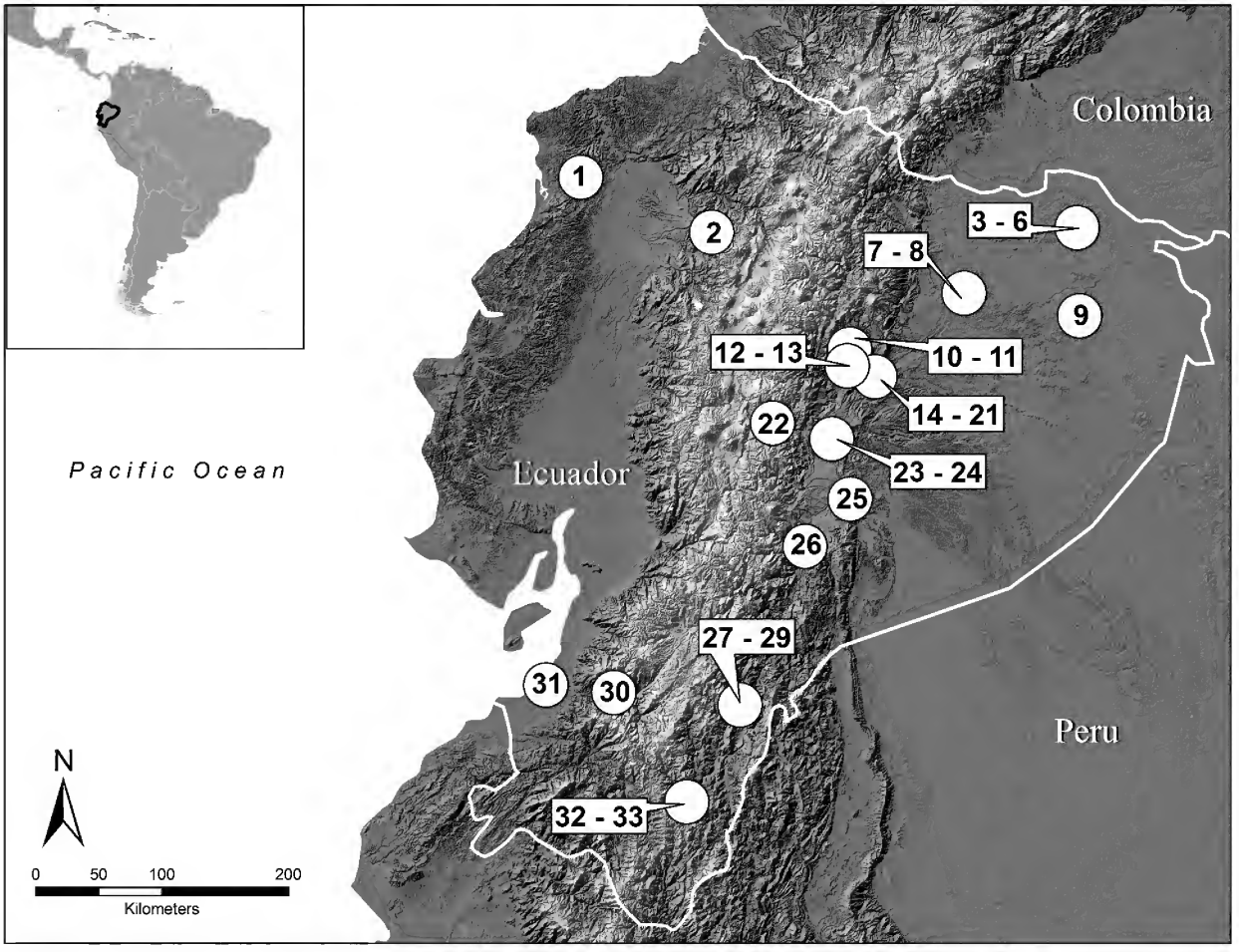

Figure 1. Locations of sites in Ecuador inventoried for bats between 20 June and 12 August 2006. Numbers correspond to locality descriptions provided in the Materials and Methods.

(0°4'13"S, 78°45'45"W; 1,344 m; 5 August 2006). This ecotourism lodge is situated among cloud forests surrounding the mountain town of Mindo. Bats were collected using mist nets placed along trails throughout the surrounding cloud forests.

Sucumbíos Province:

Site 3.—12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Cuyabeno Lodge (0°0'35"S, 76°10'54"W; elevation 223 m; 20 and 23 July 2006). This locality is a clear-cut area surrounding the cabins built for this reserve. A vertical canopy net was stretched between two trees on the grounds with no understory. Additional nets were placed across the manicured lawn adjacent to intact lowland forest.

Site 4.—12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Laguna Grande (0°0'25"S, 76°10'59"W; elevation 235 m; 21 June 2006). This locality consists of primary lowland forest on the eastern shores of Laguna Grande, the largest lake by the Cuyabeno River. Two canopy nets were suspended across a clearing and one additional net was stretched on the trail entrance along the shores of the lagoon.

Site 5.—12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Palma Roja (0°0'55"S, 76°9'55"W; elevation 239 m; 22 June 2006). This locality consists of primary lowland forest southeast of the Laguna Grande. One net was placed in front of a hollow tree and three additional nets stretched across the trail clearing in the understory.

Site 6.—0.25 km N, 1.9 km E Marian, Puente del Cuyabeno (0°1'51"S, 76°18'58"W; elevation 236 m; 24 June 2006). This locality serves as the launching point into the Cuyabeno River and consists of a small rural community with housing and cleared secondary growth forest surrounding. Bats were collected in the rafters of an abandoned house on the edge of the forest.

Orellana Province:

Site 7.—Coca, at intersection of the streets Quito and Espejo (0°28'24"S, 76°59'4"W; elevation 251 m; 25 June 2006). This locality included a colony of bats roosting in the crack between two adjacent buildings in downtown Coca. Bats were captured by placing a mist net in front of the roost exit.

Site 8.—Coca, 0.7 km S, 1.2 km E Río Napo bridge southern end, road on south side of Río Napo (0°28'54"S, 76°58'9"W; elevation 258 m; 0°28'46"S, 76°58'36"W; elevation 263 m; 0°29'3"S, 76°58'1"W; elevation 255 m; 24 June 2006). This locality consisted of three concrete culverts spaced along the dirt road on the southeast side of Coca and the Napo River. Cleared pastureland and secondary forests bordered the road. Bats were collected from the culverts using a hand net.

Site 9.—Estación de Biodiversidad Tiputini (0°38'5"S, 76°09'53"W; elevation 232 m; 12 August 2006). This locality is in prime terra firme rainforest along the Tiputini River in Yasuní National Park. Mist nets were suspended from canopy towers in the forest interior and placed along trails running along the research station's central buildings.

Napo Province:

Site 10.—3.8 km N, 1.5 km E Archidona, Cueva de Jumandi (0°52'31"S, 77°47'35"W; elevation 644 m; 6 July 2006). This locality is a popular tourist attraction that provides guided tours into a large cave system. Bats at this site were collected from the large banquet hall, where bats were observed roosting in the rafters, despite recent poisoning by park personnel.

Site 11.—4.1 km N, 1.1 km E Archidona, Cueva de Michelle (0°52'20"S, 77°47'49"W; elevation 659 m; 6 July 2006). This cave is located on private property, west of Cueva de Jumandi. The cave entrance was heavily covered in vegetation and a small creek flowed throughout the cave. Bats were collected by hand and by using a hand net during the day.

Site 12.—6.3 km N of Tena, Agua Selva Resort (0°55'57"S, 77°49'9"W; elevation 564 m; 5 July 2006). This locality was a private residence that served as a hotel that had bats roosting in the building's roof. Bats were captured by placing a mist net over the roost exit.

Site 13.—Tena, Building of the Ministerio de Obras Públicas (0°59'29"S, 77°48'51"W; elevation 500 m; 2 July 2006). This locality was a building in downtown Tena. Bats were collected by hand from the building's roof.

Site 14.—Centro de Conservación de Plantas Amazónicas, Jatun Sacha Biological Station, small creek that flows into the Napo River (1°3'50"S, 77°37'48"W; elevation 394 m; 1 July 2006). This locality serves as the nursery for various forest plants used for revegetation work at Jatun Sacha Biological Station. This site is located on the southern banks of the Napo River and consists of primary forests and cleared grounds for the nursery. Mist nets were placed along a fast flowing, clear stream that fed into the Napo River.

Site 15.—1.6 km N, 3.2 km E Jatun Sacha Biological Station Headquarters, Colonia Simón Bolívar (1°3'9"S, 77°35'14"W; elevation 384 m; 2 July 2006). This locality is a small village located northeast of the Jatun Sacha Biological Station. Mist nets were set up along a series of fish stock ponds next to a homestead surrounded by patches of bamboo and cleared forests.

Site 16.—0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead (1°4'2"S, 77°37'25"W; elevation 397 m; 28 June 2006). This locality consisted of a single house on a large cleared pasture with adjacent fish stock ponds. Nets were placed along the edge of the square fish ponds and hoisted into the few remaining *Cecropia* trees in the open pasture.

Site 17.—Jatun Sacha Biological Station Headquarters (1°4'2"S, 77°37'0"W; elevation 416 m; 29 June 2006). This locality consists of series of cabins built for volunteers at the top of the hill overlooking the Jatun Sacha Biological Station. Forests were cleared around the cabins and the cabins were situated on manicured lawns. Bats were found roosting under the easements of the cabin roofs and collected by hand. Additional specimens were collected within the reserve using standard mist netting techniques.

Site 18.—0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters (1°3'57"S, 77°37'3"W; elevation 415 m; 29 June 2006). This locality is a small clearing located along the main road heading west to Tena. This site was a creek that had been modified by road crews, who removed all the understory vegetation, but left overhanging canopy trees. Canopy nets were hoisted into the remaining trees and additional mist nets placed in the clearing below.

Site 19.—0.9 km S, 0.9 km E Jatun Sacha Biological Station Headquarters, Río Shinquipino (1°4'33"S, 77°36'33"W; elevation 424 m; 27 June 2006). This locality consisted of a fast flowing creek in primary terra firme forest. A canopy net was suspended over the creek and two additional nets stretched across the creek.

Site 20.—0.2 km S, 0.5 km W Jatuan Sacha Biological Station Headquarters (1°4'8"S, 77°37'17"W; elevation 439 m; 30 June 2006). This locality is situated off the main road to Tena and consists of cleared pasture lands and a few scattered *Cecropia* trees on a series of large hills. Mist nets were placed at the top of the hill and suspended from *Cecropia* trees.

Site 21.—0.5 km W Jatun Sacha Biological Station Headquarters, under a bridge (1°4'3"S, 77°37'17"W; elevation 417 m; 28 June 2006). This locality was a large bridge on the road running west to Tena. Bats were collected using a hand net.

Tungurahua Province:

Site 22.—8.6 km E Baños, Hacienda Río Blanco (1°23'49"S, 78°20'49"W; elevation 1701 m; 9 July 2006). This private residence is located approximately 12 km northeast of Tungurahua Volcano. Mist nets were placed on the top of a large hill that once consisted of cloud forest. Nets were placed in recently clear-cut forest and along the edge of a small patch of forest.

Pastaza Province:

Site 23.—2.6 km S, 9.1 km E Puyo, Entrance to Las Palmas, (1°30'33"S, 77°55'28"W; elevation 965 m; 10 July 2006).

Site 24.—Puyo within city limits (1°29'11"S, 78°00'24"W; 19 July 2006; elevation 950 m). A local person collected a bat from an undisclosed house within the city limits of Puyo.

Morona Santiago Province:

Site 25.—2.0 km S Charupe, Cueva de los Tayos on the Río Pastaza (1°56'12"S, 77°47'36"W; elevation 625 m; 13 July 2006). This cave system is located approximately 2 km south of Charupe on the edge of the Pastaza River. The cave is frequented by tourists. The site is surrounded by secondary forest and known to contain a small colony of oilbirds (*Steatornis caripensis*).

Site 26.—3.6 km N Macas, Nueva Jerusalén (2°16'27"S, 78°6'55"W; elevation 1,053 m; 11 July 2006). This locality was a private residence located approximately 3.5 km north of Macas. The homeowner had bats roosting in the roof and open air ceiling of her home. Bats were collected by placing mist nets over the roost exit.

Site 27.—Gualaquiza, Río Gualaquiza (3°24'1"S, 78°34'38"W; elevation 844 m; 16 July 2006). This locality consists of a manicured city park along the Gualaquiza River, which runs along the eastern edge of the town. Mist nets were suspended over the river using a bridge and large trees spanning the river. Additional nets were placed in the cleared understory of trees bordering the river.

Site 28.—Gualaquiza, intersection of the streets 24 de Mayo and Gonzalo Pesantes (3°24'5"S, 78°34'53"W; elevation 859 m; 15 July 2006). This locality was a private residence with bats roosting in the attic. Bats were captured by hand from the attic with the owner's assistance.

Site 29.—Gualaquiza, intersection of the streets Eloy Alfaro and Velazco Ibarra (3º24'11"S, 78º34'44"W; elevation 836 m; 15 July 2006). This locality consists of a roost of bats found between the easement of two adjacent buildings. Bats were collected using a mist net placed in front of their exit.

Azuay Province:

Site 30.—1.6 km S, 2.5 km W San Pedro, Río San Francisco (3º18'50"S, 79º28'28"W; elevation 801 m; 26 July 2006). This locality is north of the San Francisco River on small tributary that ran southeast through a narrow canyon into the river. Habitat was semi-arid scrub with granite rock formations and columnar cacti dotting the slopes of the steep canyon of San Francisco River.

El Oro Province:

Site 31.—Machala, Hotel Mercy on Junín Street (3º15'36"S, 79º57'22"W; elevation 5 m; 24, 27 July 2006). This locality consists of a building in downtown Machala. Bats were seen exiting from under the easement of the adjacent building and captured by placing a mist net over the exit.

Zamora-Chinchipe Province:

Site 32.—2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga (4º5'26"S, 78º57'27"W; elevation 936 m; 18-19 July 2006). This ecotourism resort sits on the western bank of the Bombuscaro River. This locality was a homestead surrounded by secondary forest with footpaths running to the river's edge. Mist nets were placed in clearings around the house and along the various foot paths.

Site 33.—1 km N, 0.8 km E Zamora (4º3'19"S, 78º56'41"W; elevation 970 m; 17 July 2006). This three-story concrete building had bats roosting under the roof apex. Bats were captured by placing a mist net over the exit while standing on the third floor ledge.

Species Identification

Individuals were identified to species using molecular identification. In the field, animals were captured and handled following the standards of the American Society of Mammalogists (Gannon et al. 2007). Specimens were either deposited in the Angelo State Natural History Collection (ASNHC) or the Sección de Mastozoología - Museo de Zoología (QCAZ) at Pontificia Universidad Católica del Ecuador with tissues from all specimens housed in the ASNHC (ASK) and QCAZ (QK-M). Tissues were preserved in lysis buffer (Longmire et al. 1997) and later extracted using the Qiagen DNeasy Tissue Kit (Qiagen Inc., Chatsworth, California). Either the cytochrome-*b* gene (cyt-*b*) or the cytochrome oxidase subunit I (*COI*) gene was amplified depending on the quantity of comparative sequences previously published and accessible through GenBank. The entire cyt-*b* gene was amplified using primers G7L and G6H (Hoffmann and Baker 2001), following the methods of Larsen et al. (2007), or primers L14724 and H15915 (Irwin et al. 1991). The *COI* gene was amplified using the primers described in Ivanova et al. (2006) and following the methods of Clare et al. (2007). Polymerase chain reaction products were purified using QIAquick PCR purification Kit (Qiagen Inc., Chatsworth, California). The first 400 base pairs of the cyt-*b* gene were sequenced with the same external primer pairs that were used to amplify the gene (either G7L or L14724) and the internal primer MVZ04 (Smith and Patton 1993). Approximately 550 base pairs of the *COI* gene were sequenced with the same primers used to amplify the gene. Cycle sequencing was performed using ABI Big Dye version 3.1 and fragments were electrophoresed on an ABI 3100-Avant Genetic Analyzer, Applied Biosystems (Foster City, California). Sequences were aligned using Sequencher 4.9 software (Gene Codes Corporation, Ann Arbor, Michigan). Comparative sequences from previously published data were downloaded from GenBank. Neighbor-joining analysis and Kimura 2-parameter distances were calculated in MEGA 4.0 (Tamura et al. 2007). Cytochrome-*b* and *COI* sequences are deposited in GenBank under the accession numbers (JF442120-JF442245). For specimens with tissues that were difficult to amplify, species identifications were confirmed using select external and cranial measurements. The taxonomic arrangement within the family Phyllostomidae follows Baker et al. (2003).

Species Accounts

Family Emballonuridae
Peropteryx leucoptera Peters 1867

Specimens collected (1♂).—SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Palma Roja, 1 (ASK 7645/QCAZ 8478).

Remarks.—One juvenile male was captured in terra firme forest in a mist net near a fallen tree. This individual represents the first record of this species for Sucumbíos Province and the northern-most distributional record for the country of Ecuador (McDonough et al. 2010).

Rhynchonycteris naso (Wied-Neuwied 1820)

Specimens collected (1♂).—NAPO PROVINCE: 1.6 km N, 3.2 km E Jatun Sacha Biological Station Headquarters, Colonia Simón Bolívar, 1 (ASK 7692/QCAZ 8525).

Remarks.—*Rhynchonycteris naso* is known from low elevations in the northern two-thirds of Ecuador (Albuja 1999). One adult male was captured in a mist net set over a tilapia tank. This individual is genetically similar to *R. naso* from Guyana and Venezuela (Lim et al. 2008).

Saccopteryx bilineata (Temminck 1838)

Specimens collected (5♀).—SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Laguna Grande, 1 (ASK 7642/QCAZ 8475); 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Palma Roja, 1 (ASK 7645/QCAZ 8478). 3 (ASK 7647/ASNHC 14033, ASK 7648/QCAZ 8481, ASK 7649/ASNHC 14034). NAPO PROVINCE: Jatun Sacha Biological Station Headquarters, 1 (ASK 7672/QCAZ 8505).

Remarks.—This common species is found at lower elevations throughout Ecuador (Albuja 1999). Bats were captured in mist nets early in the evening (18:15 - 18:40 h) near the bank of a lagoon (ASK7642) and near a tree roost (ASK 7647-7649). One individual was captured by hand from a hollow tree (ASK 7672). All *S. bilineata* individuals sequenced were similar (1.2%) to individuals collected from Parque Nacional Yasuní (Lim et al. 2008).

Saccopteryx leptura (Schreber 1774)

Specimens collected (1♂).—NAPO PROVINCE: Jatun Sacha Biological Station Headquarters, 1 (ASK 7671/QCAZ 8504).

Remarks.—This species is found in the lower elevations of eastern and western Ecuador (Albuja 1999). A single male individual was collected off the dormitory building. This individual has a unique cytochrome-*b* sequence that is 6% different from individuals collected from Parque Nacional Yasuní (Lim et al. 2008). Despite the high sequence divergence, this individual has morphological characters consistent with *S. leptura* described by Hood and Gardner (2008); dorsal stripes are evident and the forearm is 38.8 mm.

Family Phyllostomidae
Subfamily Micronycterinae
Micronycteris megalotis (Gray 1842)

Specimens collected (1♂).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing, 1 (ASK 7795/ASNHC 14035). (1♀).—PICHINCHA PROVINCE: 2.3 km S, 1.5 km E Mindo, El Monte Sustainable Lodge near Estación Biológica de Mindo, 1 (ASK 7798/QCAZ 8630).

Remarks.—These bats were captured using mist nets over small pools along a river (ASK 7795) and near a trail intersection along a rivers edge (ASK 7798). *Micronycteris megalotis* is known throughout the lowlands of western and eastern Ecuador (Albuja 1999). These bats collected from western Ecuador are ~1% genetically different than conspecifics from Ecuador included in Porter et al. (2007).

Subfamily Desmodontinae
Desmodus rotundus (E. Geoffroy St. Hilaire 1810)

Specimens collected (8♂).—AZUAY PROVINCE: 1.6 km S, 2.5 km W San Pedro, Río San Fran-

cisco, 1 (ASK 7781/QCAZ 8614). NAPO PROVINCE: 4.1 km N, 1.1 km E Archidona, Cueva de Michelle, 6 (ASK 7699/QCAZ 8532, ASK 7704/QCAZ 8537, ASK 7705/ASNHC 14038, ASK 7706/QCAZ 8539, ASK 7708/ASNHC 14039, ASK 7710/QCAZ 8543). ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7766/ASNHC 14041). (9♀).—AZUAY PROVINCE: 1.6 km S, 2.5 km W San Pedro, Río San Francisco, 2 (ASK 7783/ASNHC 14042, ASK 7784/ASNHC 14043). NAPO PROVINCE: 4.1 km N, 1.1 km E Archidona, Cueva de Michelle, 7 (ASK 7698/QCAZ 8531, ASK 7700/ASNHC 14036, ASK 7701/QCAZ 8534, ASK 7702/QCAZ 8535, ASK 7703/ASNHC 14037, ASK 7707/QCAZ 8540, ASK 7709/ASNHC 14040).

Remarks.—A colony of approximately 50-100 vampire bats were found roosting in Cueva de Michelle, near the popular tourist site of Cueva de Jumandi. In Zamora Chinchipe province, a single male was captured from a mist net along a river. In Azuay Province, three vampire bats were captured near a bridge along a small creek leading to the San Francisco River. Using mitochondrial cytochrome-*b* gene sequences from *D. rotundus* across Ecuador—including specimens from east and west of the Andes collected during this expedition—Pinto (2009) identified distinct mitochondrial lineages corresponding to clades east and west of the Andes Mountains.

Subfamily Lonchorhininae

Lonchorhina aurita Tomes 1863

Specimens collected (3♀).—MORONA SANTIAGO PROVINCE: 2.0 km S Charupe, Cueva de los Tayos on the Río Pastaza, 3 (ASK 7734/QCAZ 8567, ASK 7736/ASNHC 14044, ASK 7738/QCAZ 8571).

Remarks.—These bats were captured by hand from a large cave known to house a small colony of oilbirds (*Steatornis caripensis*). *Lonchophylla robusta* were also found roosting in this cave. This species is known from the tropical forests along the slopes of the Andes (Albuja 1999) at elevations of 50 to 1,600 m (Tirira 2007). Our *L. aurita* specimens from eastern Ecuador are ~3% different from conspecifics from Mexico as presented in Hoffmann et al. (2008).

Subfamily Phyllostominae

Tribe Phyllostomini

Mimon crenulatum (E. Geoffroyi 1803)

Specimens collected (1♀).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7674/QCAZ 8507).

Remarks.—This individual was captured using mist nets in a disturbed clearing along a forest. Few sequences were available on GenBank for comparison; however, when compared with an individual from the Caribbean island of Trinidad included in Hoffmann et al. (2008), this individual from eastern Ecuador was 6% different, indicating that there is unrecognized diversity, perhaps distributed as phylogroups, within this genus.

Phyllostomus hastatus (Pallas 1767)

Specimens collected (1♂).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7679/QCAZ 8512). (2♀).—ORELLANA PROVINCE: Coca, at intersection of the streets Quito and Espejo, 2 (ASK 7656/QCAZ 8489, ASK 7657/ASNHC 14045).

Remarks.—*Phyllostomus hastatus* is widespread throughout Ecuador at elevations <1,200 m (Tirira 2007). We observed this species utilizing a wide variety of urban roosts including the junctures between buildings, bridges, a hollowed out utility pole, church bell towers, and in houses with open-air windows and exposed rafters. Cytochrome-*b* sequences were not available for this species on GenBank for comparison and thus these specimens were identified only using morphological characteristics (Williams and Genoways 2008). These three individuals were identified based on forearm measurements ranging from 86-87 mm.

Tonatia saurophila Koopman and Williams 1951

Specimens collected (1♂).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing, 1 (ASK 7794/QCAZ 8627).

Remarks.—Only two species of *Tonatia* are currently recognized (Simmons 2005). *Tonatia sau-*

rophila has a wide range that extends from Mexico to northeastern Brazil and northern Paraguay as well as northwestern Ecuador, whereas *Tonatia bidens* is restricted to northern Argentina and Paraguay. This specimen from Esmeraldas was compared with *T. saurophila* GenBank sequences from Guyana, Bolivia, Panama, and eastern Ecuador presented in Baker et al. (2004) and Hoffmann et al. (2008). The genetic data reveal that there is unrecognized diversity within *T. saurophila*. Individuals from western Ecuador form a distinct clade with 1-2% divergence from individuals from Central America (Baker et al. 2004). *Tonatia saurophila* collected from western Ecuador are ~7% divergent from specimens recognized as conspecifics from eastern Ecuador.

Subfamily Glossophaginae
Tribe Choeronycterini
Anoura caudifer (E. Geoffroy St. St. Hilaire 1818)

Specimens collected (1♀).—ZAMORA-CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7768/QCAZ 8601).

Remarks.—A single, pregnant female was captured in sympatry with *Anoura cultrata*. Sequences were not available for comparison on GenBank; however, this specimen was identified based on morphology (Griffiths and Gardner 2008).

Anoura cultrata Handley 1960

Specimens collected (1♂).—ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7765/QCAZ 8598).

Remarks.—According to Tirira (2007) most records of this species have been reported above 900 m elevation. We captured a single individual in mist nets placed along footpaths in secondary forest at an approximate elevation of 936 m. Sequences were not available for comparison on GenBank; however, this specimen was identified based on morphology (Griffiths and Gardner 2008).

Tribe Glossophagini
Glossophaga soricina (Pallas 1766)

Specimens collected (1♀).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7682/QCAZ 8515).

Remarks.—Hoffmann and Baker (2001) identified two different genetic lineages of *G. soricina* from both sides of the Andes Mountains. The single individual that we captured from eastern Ecuador clustered (~1.5% divergence) with *G. soricina* from eastern Peru and other South American specimens from east of the Andes (Hoffmann and Baker 2001).

Subfamily Lonchophyllinae
Lonchophylla robusta Miller 1912

Specimens collected (1♂).—MORONA SANTIAGO PROVINCE: 2.0 km S Charupe, Cueva de los Tayos on the Río Pastaza, 1 (ASK7733/QCAZ8566) (2♀).—MORONA SANTIAGO PROVINCE: 2.0 km S Charupe, Cueva de los Tayos on the Río Pastaza, 2 (ASK 7735/ASNHC 14046, ASK 7737/QCAZ 8570).

Remarks.—These three individuals were collected with a hand net in a large limestone cave known to house a colony of oilbirds (*Steatornis caripensis*). The cave is frequented by tourists and is found along the edge of the Pastaza River. This species, along with *Lonchorhina aurita*, were the only bats found in the cave together with a single pair of oilbirds. These *Lonchophylla* were collected from eastern Ecuador in close proximity to the locality that Dávalos and Corthals (2008) reported the presence of *L. handleyi*, *L. robusta*, and the recently described *L. orienticollina*. The individuals that we collected were ~2% divergent from Colombian specimens of *Lonchophylla robusta* west of the Andes (Dávalos 2004).

Subfamily Carolliinae
Carollia brevicauda (Schinz 1821)

Specimens collected (1♂).—ORELLANA PROVINCE: Coca, 0.7 km S, 1.2 km E Río Napo bridge southern end, road on south side of Río Napo,

1 (ASK 7651/QCAZ 8484). (1♀).—SUCUMBÍOS PROVINCE: 0.25 km N, 1.9 km E Marian, Puente del Cuyabeno, 1 (ASK 7654/ASNHC 14047).

Remarks.—This broadly distributed bat is commonly encountered in tropical and subtropical forests between 0 and 2,300 m elevation (Tirira 2007). We collected the individual from Coca in a drainage culvert running under a dirt road after some local children led us to the culvert. The individual from Sucumbíos province was collected from the rafters of an abandoned house. These *C. brevicauda* were <1% divergent from conspecifics from eastern Ecuador (TK 104530) and Peru (TK 46010) as included in Solari and Baker (2006).

Carollia castanea H. Allen 1890

Specimens collected (2♂).—NAPO PROVINCE: 0.9 km S, 0.9 km E Jatun Sacha Biological Station Headquarters, Río Shinquipino, 1 (ASK 7660/QCAZ 8493); 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7686/ASNHC 14048).

Remarks.—Two individuals of *Carollia castanea* were captured in eastern Ecuador. These individuals are genetically similar (<1% divergent) in cytochrome-*b* sequence to the unnamed clade in Solari and Baker (2006) that was formerly classified as a single species—*C. castanea* (Koopman 1993). These individuals are ~8% genetically distinct from either sister taxa—*C. benkeithi* from Boliva and Peru or *C. castanea* from Central America and western Ecuador presented in Solari and Baker (2006). This provides further evidence (see Hoffmann and Baker 2003) for the presence of additional species within the *C. castanea* complex.

Carollia perspicillata (Linnaeus 1758)

Specimens collected (3♂).—AZUAY PROVINCE: 1.6 km S, 2.5 km W San Pedro, Río San Francisco, 1 (ASK 7644/QCAZ 8477). NAPO PROVINCE: 0.5 km W Jatun Sacha Biological Station Headquarters, under a bridge, 1 (ASK 7665/QCAZ 8498). SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Cuyabeno Lodge, 1 (ASK 7782/ASNHC 1409). (5♀).—NAPO PROVINCE: 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 1 (ASK 7668/ASNHC 14050). ORELLANA PROVINCE: Coca, 0.7 km S, 1.2 km E Río Napo bridge southern end, road on south side of Río Napo, 2 (ASK 7652/QCAZ 8485, ASK 7653/ASNHC 14051). SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Cuyabeno Lodge, 2 (ASK 7638/ASNHC 14053, ASK 7643/ASNHC 14052).

Remarks.—This species is widespread and abundant throughout Ecuador (Tirira 2007) and it was one of the most commonly encountered bats during our surveys. Eleven individuals were collected from four provinces in a variety of habitats including urban buildings and houses. These individuals were genetically similar (0.0-1.7% divergence) to specimens included in Hoffmann and Baker (2003) from Ecuador, Peru, Guyana, and Brazil.

Subfamily Rhinophyllinae

Rhinophylla fischerae D. C. Carter 1966

Specimens collected (1♀).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7684/ASNHC 14054).

Remarks.—This species is the smallest member of the genus *Rhinophylla* and very little is known regarding its natural history (McLellan and Koopman 2008). We collected a single, lactating female from a small clearing situated above a creek drainage that had been modified by road crews; understory vegetation had been removed but overhanging canopy trees remained. This individual is ~5% different than the Wright et al. (1999) GenBank specimen from northwestern Peru.

Rhinophylla pumilio W. Peters 1865

Specimens collected (1♂).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7676/QCAZ 8509).

Remarks.—We collected a single male in sympatry with *Rhinophylla fischerae* (ASK 7684). Both species of *Rhinophylla* were captured shortly after midnight and both were reproductively active (testes were distended). This individual is 0.5% different than the Wright et al. (1999) GenBank specimen from northwestern Peru.

Subfamily Glyphonycterinae
Glyphonycteris daviesi (Hill 1964)

Specimens collected (1♀).—ORELLANA PROVINCE: Estación de Biodiversidad Tiputini, 1 (ASK 7800/QCAZ 8632).

Remarks.—A single individual was collected at 00:05 h in a mist net placed along the paths to the laboratory building of the Estación de Biodiversidad Tiputini. This site is characterized by primary terra firme forest located next to the Tiputini River. The only other species captured in this net belonged to the genus *Carollia*. This single individual captured from eastern Ecuador shares the same mitochondrial haplotype as the previously published individuals from eastern Ecuador included in Porter et al. (2007).

Subfamily Sternodermatinae
Tribe Sturnirini
Sturnira lilium (E. Geoffroyi St. Hilaire 1810)

Specimens collected (2♂).—NAPO PROVINCE: 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 1 (ASK 7666/ASNHC 14057); 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7675/QCAZ 8508). (3♀).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing, 1 (ASK 7792/ ASHNC 14055). NAPO PROVINCE: 1.6 km N, 3.2 km E Jatun Sacha Biological Station Headquarters, Colonia Simón Bolívar, 1 (ASK 7690/ASNHC 14056). ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7769/QCAZ 8602).

Remarks.—This species was commonly encountered at sites characterized by moist forests or lowland habitats. Individuals were collected in both pristine forest (Estación Biológica Bilsa) and disturbed habitats in Napo Province as well as on both sides of the Andes. Our specimens, collected on both side of the Andes, correspond to the *S. lilium* sequences presented in the unpublished dissertation of Iudica (2000).

Sturnira oporaphilum (Tschudi 1844)

Specimens collected (2♂).—ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 2 (ASK 7767/QCAZ 8600, ASK 7771/ASNHC 14058).

Remarks.—This species is most frequently encountered at intermediate elevations between 900 and 2,000 m (Tirira 2007). We collected two males among secondary forest at a semi-disturbed site at an elevation of 936 m. The two individuals of *S. oporaphilum* collected from eastern Ecuador share the same mitochondrial haplotype as individuals presented in Iudica (2000).

Tribe Stenodermatini
Subtribe Vampyrissina
Chiroderma villosum Peters 1860

Specimens collected (1♂).—ORELLANA PROVINCE: Estación de Biodiversidad Tiputini, 1 (ASK 7799/QCAZ 8631). (1♀).—NAPO PROVINCE: 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 1 (ASK 7667/ASNHC 14064).

Remarks.—These bats were captured near tilapia ponds bordering secondary forest and farmland (ASK7667) and in nets over a canopy tower in terra firme forest (ASK7799). These specimens from eastern Ecuador shared the same mitochondrial haplotype as *C. villosum* from eastern Peru (Velazco and Patterson 2008).

Platyrrhinus incarum (Thomas 1912)

Specimens collected (1♀).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7677/QCAZ 8510).

Remarks.—We follow the classification of Velazco and Patterson (2008) that recognizes South American populations east of the Andes as a distinct lineage from *P. helleri* under the name *P. incarum*. A single female was collected at 2:20 h in a mist net placed in an artificial clearing bordered by pastureland and secondary forest. This individual shares the same mitochondrial haplotype as specimens from Peru (Velazco and Patterson 2008).

Platyrrhinus infuscus (Peters 1880)

Specimens collected (1♂).—PASTAZA PROVINCE: Puyo within city limits, 1 (ASK 7716/QCAZ 8549).

Remarks.—P. infuscus occurs in eastern Ecuador and adjacent countries along the eastern side of the Andes (Gardner 2008). This single individual, collected from eastern Ecuador, was 0.3% divergent from specimens from Peru (Velazco and Patterson 2008).

Platyrrhinus ismaeli Velazco 2005

Specimens collected (1♂).—TUNGURAHUA PROVINCE: 8.6 km E Baños, Hacienda Río Blanco, 1 (ASK 7715/ASNHC 14066). (1♀).—TUNGURAHUA PROVINCE: 8.6 km E Baños, Hacienda Río Blanco, 1 (ASK 7714/QCAZ 8547).

Remarks.—Both specimens were collected in a mist net placed along a slope of cleared cloud forest that bordered an intact forest at an elevation of 1,700 m. These two individuals share the same mitochondrial haplotype as individuals from Peru (Velazco and Patterson 2008).

Platyrrhinus vittatus (Peters 1860)

Specimens collected (1♂).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing 1 (ASK 7793/QCAZ8626).

Remarks.—P. vittatus is found in Central America, Venezuela, and Colombia (Gardner 2008). Although previously reported from Ecuador in Sanborn (1955) and Albuja (1999), the latest revision of this species complex identifies *P. vittatus sensu stricto* as occurring only as far south as Narino Department, Colombia (Velazco 2005; Velazco and Patterson 2008). Lee et al. (2010) reported the first records of *P. vittatus sensu stricto* in the country of Ecuador with the capture of three males and five females from Imbabura Province whose identifications were confirmed using ND-2 mtDNA gene sequences. However, records from northern Ecuador reported in Albuja (1999) should be reexamined in light of the recent revisions proposed in Velazco (2005) and Velazco and Patterson (2008) to verify their taxonomic affinity. In the absence of such reexamniations, our specimen represents the first record of *P. vittatus sensu stricto* for Esmeraldas Province. The single individual collected from northwestern Ecuador is 0.6% divergent from *P. vittatus* specimens from Costa Rica and Panama (Velazco and Patterson 2008).

Uroderma bilobatum Peters 1866

Specimens collected (2♂).—NAPO PROVINCE: 0.9 km S, 0.9 km E Jatun Sacha Biological Station Headquarters, Río Shinquipino, 1 (ASK 7661/ASNHC 14067). ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7770/ASNHC 14068). (2♀).—NAPO PROVINCE: 0.9 km S, 0.9 km E Jatun Sacha Biological Station Headquarters, Río Shinquipino, 1 (ASK 7659/QCAZ 8492); 0.2 km S, 0.5 km W Jatuan Sacha Biological Station Headquarters, 1 (ASK 7687/QCAZ 8520).

Remarks.—U. bilobatum were collected at sites located near bodies of waters such as rivers, which seems to be an important habitat component for this species in Ecuador (Tirira 2007). The four individuals collected from eastern Ecuador cluster with populations from South America east of the Andes (Hoffmann and Baker 2003) with sequence divergence of 0.3-1.2%.

Vampyressa thyone Thomas 1909

Specimens collected (1♂).—PICHINCHA PROVINCE: 2.3 km S, 1.5 km E Mindo, El Monte Sustainable Lodge near Estación Biológica de Mindo, 1 (ASK 7797/QCAZ 8630).

Remarks.—This bat occurs on both sides of the Andes Mountains in Ecuador at elevations from 10 to 2,000 m (Tirira 2007). This single individual, captured at 1,350 m elevation in western Ecuador, was similar (0.3% divergent) to a specimen reported from Peru (Porter and Baker 2004).

Mesophylla macconnelli Thomas 1901

Specimens collected (1♂).—SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Cuyabeno Lodge, 1 (ASK 7641/QCAZ 8474).

Remarks.—This single individual was captured in a mist net placed alongside the residential buildings of the Cuyabeno Lodge in an artificial clearing situated among primary lowland forest. This individual shares the same mitochondrial haplotype as a specimen collected in Pastaza Province (Porter and Baker 2004).

Subtribe Artibeina

Artibeus aequatorialis (Andersen 1906)

Specimens collected (1♂).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing, 1 (ASK 7791/QCAZ 8624).

Remarks.—Within Ecuador, *A. aequatorialis* is restricted to the western side of the Andes (Larsen et al. 2010). This single individual is 2% divergent from conspecific specimens examined by Larsen et al. (2007).

Artibeus fraterculus Anthony 1924

Specimens collected (1♂).—AZUAY PROVINCE: 1.6 km S, 2.5 km W San Pedro, Río San Francisco, 1 (ASK 7780/QCAZ 8613).

Remarks.—In Ecuador, this species is restricted to dry tropical or subtropical forests of the south and southwest and is listed as least concern but with declining populations by the IUCN Red List (Tirira 2007; Carrera et al. 2011). A single individual was captured in mist nets placed over pools along a small creek that flowed into the adjacent Río San Francisco. The surrounding habitat was dry mountain slopes with columnar cacti. This specimen is 0.3% divergent from specimens from western Ecuador presented in Hoofer et al. (2008).

Artibeus lituratus (Olfers 1818)

Specimens collected (4♂).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 4 (ASK 7673/ASNHC 14059, ASK 7678/QCAZ 8511, ASK 7681/ASNHC 14060, ASK 7683/QCAZ 8516).

Remarks.—These individuals were captured in a mist nest hoisted into the canopy using pulleys. The mist net hung at the top of an artificial clearing and above a modified creek drainage. Once captured, individuals began vocalizing, often attracting other individual *A. lituratus*, which were subsequently captured in the net. The four individuals collected at this single site in eastern Ecuador demonstrate little sequence divergence (0.0 - 1.1%) compared to eastern Ecuadorian specimens from Puyo presented in Redondo et al. (2008).

Artibeus obscurus (Schinz 1821)

Specimens collected (1♂).—NAPO PROVINCE: 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7685/ASNHC 14061). (1♀).—SUCUMBÍOS PROVINCE: 12 km S, 25 km W Puerto Riera, Reserva de Producción Faunística Cuyabeno, Palma Roja, 1 (ASK 7646/QCAZ 8479).

Remarks.—A. obscurus has been recorded in a variety of habitat types ranging from tropical humid forests to open savannas (see references in Marques-Aguiar 2008). We collected a single male in a mist net set in an artificially created clearing bordering a road and cleared pastureland. The single juvenile female was collected in a mist net placed in a tree fall gap among primary lowland forest at an elevation of approximately 256 m. These individuals form a distinct clade and are 2% divergent compared to individuals from Brazil as presented in Redondo et al. (2008).

Artibeus planirostris (Spix 1823)

Specimens collected (4♂).—MORONA SANTIAGO PROVINCE: Gualaquiza, Río Gualaquiza, 2 (ASK 7752/QCAZ 8585, ASK 7754/ASNHC 14062). NAPO PROVINCE: Centro de Conservación de Plantas Amazónicas, Jatun Sacha Biological Station, small creek that flows into the Napo River, 1 (ASK 7689/QCAZ 8522); 0.16 km N, 0.1 km W Jatun Sacha Biological Station Headquarters, 1 (ASK 7680/QCAZ 8513). (1♀).—NAPO PROVINCE: 1.6 km N, 3.2 km E Jatun Sacha Biological Station Headquarters, Colonia Simón Bolívar, 1 (ASK 7693/ASNHC 14063).

Remarks.—A. planirostris displays a high degree of variation in morphology and is often difficult to distinguish from other large, sympatric *Artibeus* (Marques-Aguiar 2008). These individuals are genetically similar (~0.5%) to conspecifics collected in Sucumbíos and Pastaza Provinces (Larsen et al. 2007).

Dermanura rava Miller 1902

Specimens collected (1♀).—ESMERALDAS PROVINCE: Bilsa Biological Station, Piscinas Trail at first river crossing, 1 (ASK 7796/QCAZ 8629).

Remarks.—Within Ecuador, *Dermanura rava* is only found west of the Andes at elevations up to 2,100 m (Tirira 2007). This individual was genetically similar (<0.2% different) to other specimens of *D. rava* captured from Esmeraldas Province (Solari et al. 2009).

Dermanura glauca (Thomas 1893)

Specimens collected (1♂).—TUNGURAHUA PROVINCE: 8.6 km E Baños, Hacienda Río Blanco, 1 (ASK 7719/QCAZ 8552). (1♀).—ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7772/ASNHC 14065).

Remarks.—Within Ecuador, *Dermanura glauca* only occurs east of the Andes and most specimens have been recorded at elevations below 1,200 m (Albuja 1999). In Tungurahua Province, we caught one adult male at 1,500 m elevation. This individual was genetically similar (<1% different) to other specimens of *D. glauca* from eastern Ecuador (Solari et al. 2009).

Family Noctilionidae
Noctilio leporinus (Linnaeus 1758)

Specimens collected (1♂).—NAPO PROVINCE: 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 1 (ASK 7669/QCAZ8502).

Remarks.—The only *Noctilio leporinus* captured during our survey was collected in a mist net placed along the edge of a man-made *Tilapia* pond at 19:05 h. The surrounding habitat was cleared pastureland for cattle grazing. This single individual captured in eastern Ecuador is 0.3% divergent from specimens from eastern Peru (Lewis-Oritt et al. 2001).

Family Molossidae
Molossus molossus crassicaudatus É. Geoffroy St. Hilaire 1805

Specimens collected (11♂).—MORONA SANTIAGO PROVINCE: 3.6 km N Macas, Nueva Jerusalén, 1 (ASK 7730/ASNHC 14133); Gualaquiza, intersection of the streets Eloy Alfaro and Velazco Ibarra, 1 (ASK 7741/QCAZ 8574). NAPO PROVINCE: 6.3 km N of Tena, Agua Selva Resort, 1 (ASK 7696/QCAZ 8529); 1.6 km N, 3.2 km E Jatun Sacha Biological Station Headquarters, Colonia Simón Bolívar, 1 (ASK 7691/ASNHC 14125); 3.8 km N, 1.5 km E Archidona, Cueva de Jumandi, 1 (ASK 7713/QCAZ 8546); Tena, Ministerio de Obras Públicas, 1 (ASK 7695/ASNHC 14126). ORELLANA PROVINCE: Coca, at intersection of the streets Quito and Espejo, 1 (ASK 7655/QCAZ 8488). PASTAZA PROVINCE: 2.6 km S, 9.1 km E Puyo, Entrance to Las Palmas, 2 (ASK 7721/QCAZ 8554, ASK 7732/ASNHC 14131). ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7774/ASNHC 14142); 1 km N, 0.8 km E Zamora, 1 (ASK 7763/QCAZ 8596). (23♀).—MORONA SANTIAGO PROVINCE: 3.6 km N Macas, Nueva Jerusalén, 3 (ASK 7727/QCAZ 8560, ASK 7728/ASNHC 14132, ASK 7729/QCAZ 8562); Gualaquiza, intersection of the streets 24 de Mayo and Gonzalo Pesantes, 5 (ASK 7739/QCAZ 8572, ASK 7740/ASNHC 14134, ASK 7742/ASNHC 14135, ASK 7744/QCAZ 8577, ASK 7762/ASNHC 14136); Gualaquiza, intersection of the streets Eloy Alfaro and Velazco Ibarra, 4 (ASK 7745/ASNHC 14137, ASK 7747/QCAZ 8580, ASK 7749/14138, ASK 7761/QCAZ 8594). NAPO PROVINCE: 6.3 km N of Tena, Agua Selva Resort, 1 (ASK 7697/ASNHC 14127); 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 2 (ASK 7663/QCAZ 8496, ASK 7664/QCAZ 8497). PASTAZA PROVINCE: 2.6 km S, 9.1 km E Puyo, Entrance to Las Palmas, 3 (ASK 7720/ASNHC 14130, ASK 7722/ASNHC 14130, ASK 7731/QCAZ 8564). ZAMORA CHINCHIPE PROVINCE: 1 km N, 0.8 km E Zamora, 5 (ASK 7756/QCAZ 8589, ASK 7757/ASNHC 14139, ASK 7759/QCAZ 8592, ASK 7760/ASNHC 14140, ASK 7764/ASNHC 14141).

Remarks.—*Molossus m. crassicaudatus* is distributed in the lowlands of eastern and western Ecuador and occurs east of the Andes from Brazil and southern Colombia into Peru and Argentina (Eger 2008). Eger (2008) recognizes four subspecies within South America, indicating that genetic substructuring should exist. However, we detected a low level of intraspecific sequence variation for this subspecies and in fact for the whole genus. Our specimens of *M. m. crassicaudatus* from Ecuador were genetically similar (0.4 - 1.1%) to conspecific individuals collected in Guyana (Clare et al. 2007).

Molossus molossus daulensis J. A. Allen 1916

Specimens collected (6♂).—EL ORO PROVINCE: Machala, Hotel Mercy on Junín Street, 6 (ASK 7776/QCAZ 8609, ASK 7777/ASNHC 14119, ASK 7779/ASNHC 14120, ASK 7785/QCAZ 8618, ASK 7787/QCAZ 8620, ASK 7788/ASNHC 14122). (4♀).—EL ORO PROVINCE: Machala, Hotel Mercy on Junín Street, 4 (ASK 7778/QCAZ 8611, ASK 7786/ASNHC 14121, ASK 7789/QCAZ 8622, ASK 7790/ASNHC 14123).

Remarks.—We collected ten individuals emerging from cracks on a wall outside of a hotel in the western Ecuadorian city of Machala. *Molossus daulensis* was first described as a distinct species based on five specimens from Daule and one individual from Isla Puná, Guayas Province, Ecuador (Allen 1916). This species has been listed as a subspecies of *Molossus molossus* (Eger 2008). The specimens we collected in western Ecuador are similar in size to the holotype of *M. daulensis*. Forearm measurements for the specimens collected ranged from 34.2-35.6 mm (N = 7, adult females) compared to the holotype forearm = 36 mm (adult male). Additionally, greatest length of skull measurements for individuals collected ranged from 15.70-16.47 mm (N = 4, adult females), compared to the holotype greatest length of skull = 16.20 mm. The *M. m. daulensis* individuals that we collected form a well-supported, monophyletic clade that is 2% divergent from *M. m. crassicaudatus*. Clearly, more work is merited to determine the taxonomic boundaries within this genus.

Molossus rufus (É. Geoffroyi St. Hilaire 1805)

Specimens collected (1♀).—MORONA SANTIAGO PROVINCE: Gualaquiza, Río Gualaquiza 1 (ASK 7753/QCAZ 8586).

Remarks.—*Molossus rufus* is distributed in eastern and western Ecuador (Tirira 2007). We caught this single individual in a mist net placed on top of a bridge which crossed the Gualaquiza River. This individual is only 3% divergent, in the *COI* gene, from *M. m. crassicaudatus* and *M. m. daulensis* collected during this expedition.

Family Vespertilionidae
Subfamily Vespertilioninae
Tribe Nycticeini
Eptesicus brasiliensis (Desmarest 1819)

Specimens collected (1♂).—TUNGURAHUA PROVINCE: 8.6 km E Baños, Hacienda Río Blanco, 1 (ASK 7718/QCAZ 8551).

Remarks.—This bat occurs on both sides of the Andes in Ecuador at elevations between 50 to 1,900 m (Tirira 2007). We captured this single individual at 1,500 m among a cleared swath of cloud forest bordered by intact cloud forest. This bat was identified using the key provided in Davis and Gardner (2008) and was distinguished from other South American *Eptesicus* based on a forearm length = 42.2 mm, dorsal fur < 8 mm, greatest length of skull = 17.37 mm, and length of maxillary toothrow = 6.40 mm.

Subfamily Myotinae
Myotis riparius Handley 1960

Specimens collected (3♀).—MORONA SANTIAGO PROVINCE: Gualaquiza, intersection of the streets Eloy Alfaro and Velazco Ibarra, 3 (ASK 7743/QCAZ 8576, ASK 7748/QCAZ 8581, ASK 7750/ASNHC 14352).

Remarks.—Although typically captured in forested areas along streams or rivers (Wilson 2008), we collected three females from an enclosed attic of a house in the middle of the city of Gualaquiza where

they were roosting together with *M. m. crassicaudatus*. The *M. riparius* captured in Ecuador are ~5% divergent from supposed conspecifics recorded from Guyana (Clare et al. 2007).

Myotis spp.

We collected four genetic lineages of *Myotis* as a result of this expedition. One lineage corresponds to *Myotis riparius*, whereas the three remaining lineages are unique from published sequences (Ruedi and Mayer 2001) currently available on GenBank that we refer to as clades A, B, and C (Fig. 2). Clades A, B, and C are 3.2-6.4% divergent from each other and are more than 10% divergent from any New World *Myotis* currently available on GenBank (Table 1; see discussion for further justification). Select measurements for the three clades are presented in Table 2.

Myotis Clade A

Specimens collected (3♀).—NAPO PROVINCE: 0.7 km W Jatuan Sacha Biological Station Headquarters, private homestead, 1 (ASK 7662/QCAZ

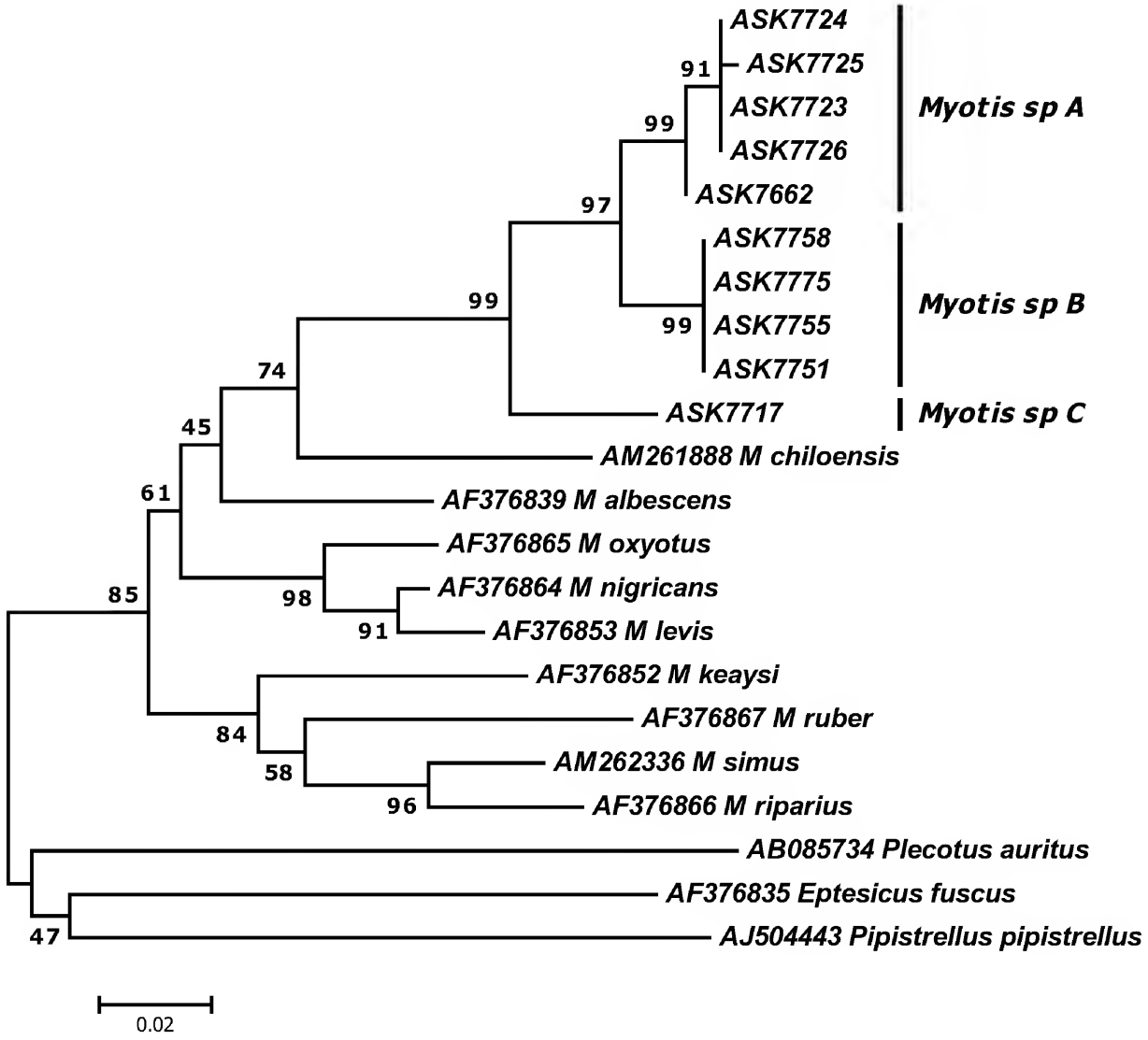

Figure 2. Cytochrome-*b* neighbor-joining tree depicting the relationship of the Ecuadorian *Myotis* (ASK numbers) to other South American *Myotis* deposited on GenBank. Numbers along the branches are bootstrap support percentages.

Table 1. Kimura 2-parameter genetic distances (Kimura 1980) between species of Ecuadorian Myotis *collected on this expedition (*Myotis *Clade A, B, and C) and sequences from GenBank.*

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	*Myotis* Clade A													
2	*Myotis* Clade B	3.2												
3	*Myotis* Clade C	6.0	6.4											
4	*Myotis chiloensis*	13.0	12.1	11.0										
5	*Myotis albescens*	12.7	11.7	12.1	11.0									
6	*Myotis oxyotus*	14.2	13.9	14.3	10.7	8.0								
7	*Myotis levis*	15.7	14.7	14.3	10.4	9.0	4.5							
8	*Myotis nigricans*	14.2	13.2	12.8	10.0	8.7	4.2	2.0						
9	*Myotis keaysi*	17.7	15.9	14.7	13.6	11.1	11.8	11.8	12.5					
10	*Myotis ruber*	19.3	18.2	18.6	15.8	12.8	13.2	15.4	14.7	11.5				
11	*Myotis simus*	17.3	17.0	15.8	14.6	12.5	11.4	12.8	12.8	9.7	9.3			
12	*Myotis riparius*	16.4	17.7	17.3	16.1	15.0	13.5	14.3	14.3	10.4	11.4	4.8		
13	*Eptesicus fuscus*	22.7	24.0	14.5	20.7	22.7	21.5	19.9	19.9	21.9	20.7	21.1	20.6	

Table 2. Select measurements (in mm) of Myotis *from clades A, B, and C for comparison with Moratelli and Wilson (2010).*

	Clade A ASK7724	Clade B ASK7755	Clade C ASK7717
Forearm	35.9	35.7	37.2
Ears	12.8	13.7	12.7
Greatest length of skull	14.5	14.3	14.7
Length of maxillary toothrow	5.2	5.3	5.5
Interorbital constriction	3.7	3.6	3.7
Breadth of braincase	7.1	7.1	7.2
Cranial index	78.3	77.1	80.2

8495). MORONA SANTIAGO PROVINCE: 3.6 km N Macas, Nueva Jerusalén, 2 (ASK 7723/QCAZ 8556, ASK 7725/QCAZ 8558). (2♂).—MORONA SANTIAGO PROVINCE: 3.6 km N Macas, Nueva Jerusalén, 2 (ASK 7724/ASNHC 14353, ASK 7726 ASNHC 14354).

Remarks.—ASK 7662 was collected at 434 m, all other individuals in clade A were captured at 1,093 m.

Myotis Clade B

Specimens collected (3♀).—ZAMORA CHINCHIPE PROVINCE: 2.8 km S, 0.6 km W Zamora, Bombuscaro Valley, Cabinas Copalinga, 1 (ASK 7775/QCAZ 8608); 1 km N, 0.8 km E Zamora, 2 (ASK 7755/ASNHC 14355, ASK 7758/QCAZ 8591). (1♂).—MORONA SANTIAGO PROVINCE: Gualaquiza, Río Gualaquiza 1 (ASK 7751/QCAZ 8584).

Remarks.—The four specimens included in clade B were captured in the southeastern provinces of Zamora Chinchipe and Morona Santiago at elevations <1,000 m.

Myotis Clade C

Specimens collected (1♂).—TUNGURAHUA PROVINCE: 8.6 km E Baños, Hacienda Río Blanco, 1 (ASK 7717/QCAZ 8550).

Remarks.—This individual was collected outside of the town of Baños at 1,503 m elevation.

DISCUSSION

A total of 361 bats were captured, of which 163 individuals representing 45 species were collected and prepared as traditional museum vouchers with associated tissues. During our surveys of urban environments we documented five genera of bats using anthropogenic roosts (Table 3). *Phyllostomus* was found roosting in the greatest variety of anthropogenic structures (n = 5) followed by *Molossus* and *Carollia* (n = 3). *Molossus* were found roosting most commonly in between the juncture of adjacent buildings or under roof tiles or sheet metal. Although we spent a considerable amount of time searching urban environments and anthropogenic roosts, we were able to document only one genus of molossid, *Molossus*, using such techniques. This was surprising considering the frequency at which other molossids, most notably *Tadarida* and *Eumops,* have been found in anthropogenic roosts sites in South America (Reis et al. 2002; Sodré et al. 2008).

This trip resulted in new distributional or rare records for the country of Ecuador. For example, our specimen of *Peropteryx leucoptera* represents the first record for Sucumbíos Province (McDonough et al. 2010). We also report the first record of *P. vittatus* for Esmeraldas Province that is also the third record of *Platyrrhinus vitattus* for Ecuador. In light of molecular identifications, these three records represent the first three records of *P. vittatus sensu stricto* for Ecuador. However, given the complex taxonomic history of this group and former records assigned to this species, its distributional limits within Ecuador probably remain ambiguous. Reexamination of past records assigned to this group may help to shed light on this situation.

Other specimens captured on this expedition represent unique genetic lineages that require further investigation to determine precise species boundaries. Two individuals of the *Carollia castanea* complex showed a unique genetic lineage that coincide with other individuals from eastern Ecuador reported in Solari and Baker (2006). We also found a high level of intraspecific sequence divergence in some species such as *Mimon crenulatum* (6%), *Tonatia sauraphila* (7%), and *Saccopteryx leptura* (6%), indicating that unrecognized biodiversity exists within these genera.

Two bat genera that we captured, *Molossus* and *Myotis*, require further examination in a broader systematic context. We captured three species of *Molossus*: *M. m. crassicaudatus*, *M. rufus*, and a third, smaller form from western Ecuador. We agree with Allen's (1916) assessment that the smaller forms from western Ecuador be considered distinct species, *M. daulensis*. Although interspecific variation in the *COI*

Table 3. Bat genera documented using anthropogenic roosts during bat surveys of 33 sites in Ecuador, 20 June – 12 August 2006.

	Carollia	*Molossus*	*Myotis*	*Phyllostomus*	*Saccopteryx*
Joint/Crack Between Two Buildings		X		X	
Bridge	X			X	
Culvert	X				
Utility Poll				X	
Bell Tower				X	
Attic		X	X		
Beneath Roof Tiles		X			
Open Air Rafters	X			X	
Cabin Wall					X

gene is relatively low in *Molossus*, ranging from 2% (between *M. m. crassicaudatus* and *M. m. daulensis*) to 3% (between *M. rufus* and *M. m. crassicaudatus/M. m. daulensis*), these three species are readily distinguished based on size.

In the case of *Myotis*, seven species occur in Ecuador (Wilson 2008; Moratelli and Wilson 2010): *M. albescens* (E. Geoffroy 1806); *M. keaysi* J. A. Allen 1914; *M. nigricans* (Schinz 1821); *M. oxyotus* (Peters 1867); *M. riparius* Handley 1960; *M. simus* Thomas 1901; and *M. diminutus* (Moratelli and Wilson 2010) — the last species has recently been described from the western slope of the Andes Mountains in northwestern Ecuador. Using the key to Ecuadorian *Myotis* presented in Moratelli and Wilson (2010), measurements of representatives from clades A, B, and C are most similar to *M. nigricans* (see Table 3). Members from the three clades have dorsal fur longer than 3 mm, fringe of hair on the uropatagium is lacking, sagittal crest is absent, greatest length of skull is more than 13 mm, and the cranial index is greater than 68. However our specimens are not consistent with all characters in the description of *M. nigricans* because the forearms are greater than 35 mm, ranging from 35.7 to 37.2 mm. Our forearm, greatest length of skull, and cranial index measurements are more consistent with *M. oxyotus*; however the ears of our specimens are much smaller. Regardless of these morphological inconsistencies, we identified three unique genetic lineages of *Myotis* that do not correspond to species designated in Ruedi and Mayer (2001) or any sequences currently available on GenBank. Furthermore, the genetic distances between the three clades are similar to several of the sister species presented in Ruedi and Mayer (2001).

Our study provides an assessment of a somewhat unique survey approach for bats in the country of Ecuador. Rather than intensely surveying a single location, we chose to sample a larger number of localities with emphasis placed upon anthropogenic habitats and roosts. Despite our efforts for capturing molossids, we only recorded three species, all within the genus *Molossus*, further confirming the difficulty associated with trapping members of this family in the neotropics. Our results highlight several important distributional records of bats for Ecuador and emphasize particular groups that warrant further study.

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Addresses of authors:

Molly M. McDonough

Department of Biology
Angelo State University
San Angelo, Texas 76909

Current Address:
Department of Biological Sciences
Texas Tech University
Lubbock, Texas 79409-3131
mollymcdonough@gmail.com

Adam W. Ferguson

Department of Biology
Angelo State University
San Angelo, Texas 76909

Current Address:
Department of Biological Sciences
Texas Tech University
Lubbock, Texas 79409-3131
adamwferguson@gmail.com

Loren K. Ammerman

Department of Biology
Angelo State University
San Angelo, Texas 76909-0890
loren.ammerman@angelo.edu

Carolina Granja-Vizcaino

Sección Mastozoología - Museo de Zoología
Pontifica Universidad Católica del Ecuador
Quito, Ecuador
carolinagranjavizcaino@gmail.com

Santiago F. Burneo

Sección Mastozoología - Museo de Zoología
Pontificia Universidad Católica del Ecuador
Quito, Ecuador
SBURNEO@puce.edu.ec

Robert J. Baker

Department of Biological Sciences and the Museum
Texas Tech University
Lubbock, Texas 79409-3131
robert.baker@ttu.edu

APPENDIX

Specimens collected in Ecuador during fieldwork conducted 20 June – 12 August 2006. Location of voucher specimen (depositing institution), museum catalog numbers (QCAZ and ASNHC) and tissue number (ASK and QCAZ), GenBank number, gene sequenced, and species name are listed. Dashes indicate that no sequence was generated and the individual was identified based on morphology.

Depositing Institution	QCAZ #	ASK #	ASNHC #	GenBank #	Gene	Species
QCAZ	8601	7768		—	—	*Anoura caudifer*
QCAZ	8598	7765		—	—	*Anoura cultrata*
QCAZ	8624	7791		JF442188	Cyt-*b*	*Artibeus aequatorialis*
QCAZ	8613	7780		JF442186	Cyt-*b*	*Artibeus fraterculus*
ASNHC	8506	7673	14059	JF442144	Cyt-*b*	*Artibeus lituratus*
QCAZ	8511	7678		JF442149	Cyt-*b*	*Artibeus lituratus*
ASNHC	8514	7681	14060	JF442152	Cyt-*b*	*Artibeus lituratus*
QCAZ	8516	7683		JF442154	Cyt-*b*	*Artibeus lituratus*
QCAZ	8479	7646		JF442125	Cyt-*b*	*Artibeus obscurus*
ASNHC	8518	7685	14061	JF442156	Cyt-*b*	*Artibeus obscurus*
QCAZ	8513	7680		JF442151	Cyt-*b*	*Artibeus planirostrus*
QCAZ	8522	7689		JF442159	Cyt-*b*	*Artibeus planirostrus*
ASNHC	8526	7693	14063	JF442162	Cyt-*b*	*Artibeus planirostrus*
QCAZ	8585	7752		JF442176	Cyt-*b*	*Artibeus planirostrus*
ASNHC	8587	7754	14062	JF442177	Cyt-*b*	*Artibeus planirostrus*
QCAZ	8484	7651		JF442129	Cyt-*b*	*Carollia brevicauda*
ASNHC	8487	7654	14047	JF442132	Cyt-*b*	*Carollia brevicauda*
QCAZ	8493	7660		JF442134	Cyt-*b*	*Carollia castanea*
ASNHC	8519	7686	14048	JF442157	Cyt-*b*	*Carollia castanea*
ASNHC	8471	7638	14053	JF442120	Cyt-*b*	*Carollia perspicillata*
ASNHC	8476	7643	14052	JF442123	Cyt-*b*	*Carollia perspicillata*
QCAZ	8477	7644		JF442124	Cyt-*b*	*Carollia perspicillata*
QCAZ	8485	7652		JF442130	Cyt-*b*	*Carollia perspicillata*
ASNHC	8486	7653	14051	JF442131	Cyt-*b*	*Carollia perspicillata*
QCAZ	8498	7665		JF442137	Cyt-*b*	*Carollia perspicillata*
ASNHC	8501	7668	14050	JF442140	Cyt-*b*	*Carollia perspicillata*
ASNHC	8615	7782	14049	JF442187	Cyt-*b*	*Carollia perspicillata*
ASNHC	8500	7667	14064	JF442139	Cyt-*b*	*Chiroderma villosum*
QCAZ	8631	7799		JF442196	Cyt-*b*	*Chiroderma villosum*
QCAZ	8552	7719		JF442167	Cyt-*b*	*Dermanura glauca*
ASNHC	8605	7772	14065	JF442184	Cyt-*b*	*Dermanura glauca*
QCAZ	8629	7796		JF442193	Cyt-*b*	*Dermanura rava*
QCAZ	8531	7698		*a*	Cyt-*b*	*Desmodus rotundus*

Appendix (cont.)

Depositing Institution	QCAZ #	ASK #	ASNHC #	GenBank #	Gene	Species
QCAZ	8532	7699		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8533	7700	14036	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8534	7701		*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8535	7702		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8536	7703	14037	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8537	7704		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8538	7705	14038	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8539	7706		*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8540	7707		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8541	7708	14039	*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8542	7709	14040	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8543	7710		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8599	7766	14041	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8614	7781		*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8616	7783	14042	*a*	Cyt-*b*	*Desmodus rotundus*
ASNHC	8617	7784	14043	*a*	Cyt-*b*	*Desmodus rotundus*
QCAZ	8551	7718		—	—	*Eptesicus brasiliensis*
QCAZ	8515	7682		JF442153	Cyt-*b*	*Glossophaga soricina*
QCAZ	8632	7800		JF442197	Cyt-*b*	*Glyphonycteris daviesi*
QCAZ	8566	7733		*b*	Cyt-*b*	*Lonchophylla robusta*
ASNHC	8568	7735	14046	*b*	Cyt-*b*	*Lonchophylla robusta*
QCAZ	8570	7737		*b*	Cyt-*b*	*Lonchophylla robusta*
QCAZ	8567	7734		JF442172	Cyt-*b*	*Lonchorhina aurita*
ASNHC	8569	7736	14044	JF442173	Cyt-*b*	*Lonchorhina aurita*
QCAZ	8571	7738		JF442174	Cyt-*b*	*Lonchorhina aurita*
QCAZ	8474	7641		JF442121	Cyt-*b*	*Mesophylla macconnelli*
ASNHC	8628	7795	14035	JF442192	Cyt-*b*	*Micronycteris megalotis*
QCAZ	8630	7798		JF442195	Cyt-*b*	*Micronycteris megalotis*
QCAZ	8507	7674		JF442145	Cyt-*b*	*Mimon crenulatum*
QCAZ	8609	7776		JF442236	*COI*	*Molossus currentium*
ASNHC	8610	7777	14119	JF442237	*COI*	*Molossus currentium*
QCAZ	8611	7778		JF442238	*COI*	*Molossus currentium*
ASNHC	8612	7779	14120	JF442239	*COI*	*Molossus currentium*
QCAZ	8618	7785		JF442240	*COI*	*Molossus currentium*
ASNHC	8619	7786	14121	JF442241	*COI*	*Molossus currentium*
QCAZ	8620	7787		JF442242	*COI*	*Molossus currentium*
ASNHC	8621	7788	14122	JF442243	*COI*	*Molossus currentium*

APPENDIX (CONT.)

Depositing Institution	QCAZ #	ASK #	ASNHC #	GenBank #	Gene	Species
QCAZ	8622	7789		JF442244	*COI*	*Molossus currentium*
ASNHC	8623	7790	14123	JF442245	*COI*	*Molossus currentium*
QCAZ	8488	7655		JF442198	*COI*	*Molossus molossus*
QCAZ	8496	7663		JF442199	*COI*	*Molossus molossus*
QCAZ	8497	7664		JF442200	*COI*	*Molossus molossus*
ASNHC	8524	7691	14125	JF442201	*COI*	*Molossus molossus*
ASNHC	8528	7695	14126	JF442202	*COI*	*Molossus molossus*
QCAZ	8529	7696		JF442203	*COI*	*Molossus molossus*
ASNHC	8530	7697	14127	JF442204	*COI*	*Molossus molossus*
QCAZ	8546	7713		JF442205	*COI*	*Molossus molossus*
ASNHC	8553	7720	14129	JF442206	*COI*	*Molossus molossus*
QCAZ	8554	7721		JF442207	*COI*	*Molossus molossus*
ASNHC	8555	7722	14130	JF442208	*COI*	*Molossus molossus*
QCAZ	8560	7727		JF442209	*COI*	*Molossus molossus*
ASNHC	8561	7728	14132	JF442210	*COI*	*Molossus molossus*
QCAZ	8562	7729		JF442211	*COI*	*Molossus molossus*
ASNHC	8563	7730	14133	JF442212	*COI*	*Molossus molossus*
QCAZ	8564	7731		JF442213	*COI*	*Molossus molossus*
ASNHC	8565	7732	14131	JF442214	*COI*	*Molossus molossus*
QCAZ	8572	7739		JF442215	*COI*	*Molossus molossus*
ASNHC	8573	7740	14134	JF442216	*COI*	*Molossus molossus*
QCAZ	8574	7741		JF442217	*COI*	*Molossus molossus*
ASNHC	8575	7742	14135	JF442218	*COI*	*Molossus molossus*
QCAZ	8577	7744		JF442220	*COI*	*Molossus molossus*
ASNHC	8578	7745	14137	JF442221	*COI*	*Molossus molossus*
QCAZ	8580	7747		JF442222	*COI*	*Molossus molossus*
ASNHC	8582	7749	14138	JF442224	*COI*	*Molossus molossus*
QCAZ	8589	7756		JF442227	*COI*	*Molossus molossus*
ASNHC	8590	7757	14139	JF442228	*COI*	*Molossus molossus*
QCAZ	8592	7759		JF442229	*COI*	*Molossus molossus*
ASNHC	8593	7760	14140	JF442230	*COI*	*Molossus molossus*
QCAZ	8594	7761		JF442231	*COI*	*Molossus molossus*
ASNHC	8595	7762	14136	JF442232	*COI*	*Molossus molossus*
QCAZ	8596	7763		JF442233	*COI*	*Molossus molossus*
ASNHC	8597	7764	14141	JF442234	*COI*	*Molossus molossus*
ASNHC	8607	7774	14142	JF442235	*COI*	*Molossus molossus*
QCAZ	8586	7753		JF442226	*COI*	*Molossus rufus*

Appendix (cont.)

Depositing Institution	QCAZ #	ASK #	ASNHC #	GenBank #	Gene	Species
QCAZ	8495	7662		JF442136	Cyt-*b*	*Myotis* clade A
QCAZ	8556	7723		JF442168	Cyt-*b*	*Myotis* clade A
ASNHC	8557	7724	14353	JF442169	Cyt-*b*	*Myotis* clade A
QCAZ	8558	7725		JF442170	Cyt-*b*	*Myotis* clade *A*
ASNHC	8559	7726	14354	JF442171	Cyt-*b*	*Myotis* clade A
ASNHC	8588	7755	14355	JF442178	Cyt-*b*	*Myotis* clade B
QCAZ	8591	7758		JF442179	Cyt-*b*	*Myotis* clade B
QCAZ	8608	7775		JF442185	Cyt-*b*	*Myotis* clade B
QCAZ	8550	7717		JF442166	Cyt-*b*	*Myotis* clade C
QCAZ	8576	7743		JF442219	*COI*	*Myotis riparius*
QCAZ	8581	7748		JF442223	*COI*	*Myotis riparius*
ASNHC	8583	7750	14355	JF442225	*COI*	*Myotis riparius*
QCAZ	8584	7751		JF442175	Cyt-*b*	*Myotis riparius*
QCAZ	8502	7669		JF442141	Cyt-*b*	*Noctilio leporinus*
QCAZ	8478	7645		HM367876	Cyt-*b*	*Peropteryx leucoptera*
QCAZ	8489	7656		—	—	*Phyllostomus hastatus*
ASNHC	8490	7657	14045	—	—	*Phyllostomus hastatus*
QCAZ	8512	7679		JF442150	Cyt-*b*	*Phyllostomus hastatus*
QCAZ	8510	7677		JF442148	Cyt-*b*	*Platyrrhinus incarum*
QCAZ	8549	7716		JF442165	Cyt-*b*	*Platyrrhinus infuscus*
QCAZ	8547	7714		JF442163	Cyt-*b*	*Platyrrhinus ismaeli*
ASNHC	8548	7715	14066	JF442164	Cyt-*b*	*Platyrrhinus ismaeli*
QCAZ	8626	7793		JF442190	Cyt-*b*	*Platyrrhinus vittatus*
QCAZ	8509	7676		JF442147	Cyt-*b*	*Rhinophylla fisherae*
ASNHC	8517	7684	14054	JF442155	Cyt-*b*	*Rhinophylla fisherae*
QCAZ	8525	7692		JF442161	Cyt-*b*	*Rhynchonycteris naso*
QCAZ	8475	7642		JF442122	Cyt-*b*	*Saccopteryx bilineata*
ASNHC	8480	7647	14033	JF442126	Cyt-*b*	*Saccopteryx bilineata*
QCAZ	8481	7648		JF442127	Cyt-*b*	*Saccopteryx bilineata*
ASNHC	8482	7649	14034	JF442128	Cyt-*b*	*Saccopteryx bilineata*
QCAZ	8505	7672		JF442143	Cyt-*b*	*Saccopteryx bilineata*
QCAZ	8504	7671		JF442142	Cyt-*b*	*Saccopteryx leptura*
ASNHC	8499	7666	14057	JF442138	Cyt-*b*	*Sturnira lilium*
QCAZ	8508	7675		JF442146	Cyt-*b*	*Sturnira lilium*
ASNHC	8523	7690	14056	JF442160	Cyt-*b*	*Sturnira lilium*
QCAZ	8602	7769		JF442181	Cyt-*b*	*Sturnira lilium*
ASNHC	8625	7792	14055	JF442189	Cyt-*b*	*Sturnira lilium*

APPENDIX (CONT.)

Depositing Institution	QCAZ #	ASK #	ASNHC #	GenBank #	Gene	Species
QCAZ	8600	7767		JF442180	Cyt-*b*	*Sturnira oporaphilum*
ASNHC	8604	7771	14058	JF442183	Cyt-*b*	*Sturnira oporaphilum*
QCAZ	8627	7794		JF442191	Cyt-*b*	*Tonatia bidens*
QCAZ	8492	7659		JF442133	Cyt-*b*	*Uroderma bilobatum*
ASNHC	8494	7661	14067	JF442135	Cyt-*b*	*Uroderma bilobatum*
QCAZ	8520	7687		JF442158	Cyt-*b*	*Uroderma bilobatum*
ASNHC	8603	7770	14068	JF442182	Cyt-*b*	*Uroderma bilobatum*
QCAZ	8630	7797		JF442194	Cyt-*b*	*Vampyressa thyone*

[a] Sequences included in the M.S. Thesis of Pinto (2009).

[b] Sequences to be presented in a future manuscript.

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